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Scientific Areas of Integrated Review Groups (IRGs)

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Bioengineering Sciences and Technologies IRG [BST]

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- [Instrumentation and Systems Development \[ISD\]](#)
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Instrumentation and Systems Development [ISD]

[\[ISD Roster\]](#)

The Instrumentation and Systems Development [ISD] study section will consider research applications (R01, R21, SBIR/STTR, etc.) seeking to design and develop novel instrumentation and systems for biological research. Although a test biological problem may be used to provide context, grant applications referred to this study section need not necessarily be hypothesis driven. Small business applications (SBIR and STTR) are reviewed mainly in special emphasis panels.

Specific areas covered by ISD include:

- Analytical instrumentation: The design and development of novel instrumentation for biological research. Examples are mass spectrometry, magnetic resonance spectroscopy, x-ray, neutron and electron crystallography, solution scattering, and 2D and 3D imaging technologies for fluorescence, scanning tunneling microscopy, atomic force microscopy, electron microscopy, vibrational spectroscopic microscopy, x-ray photoelectron spectroscopy, and hardware and computer systems.
- Sensing devices: Approaches to the detection and quantification of biologically important molecules, including both small molecule and macromolecular species. The development of such devices may require new surface chemistries and chemical, electrical, or other detection

modalities, and may range in scope from devices for the analysis of a single analyte species to devices for the parallel analysis of thousands or millions of species. Also of interest are sensors of endogenous electric and magnetic fields in biological systems.

- Separation technologies: Improvements and variations to classical techniques such as electrophoresis and chromatography, as well as the exploration and development of novel approaches, including molecule, assembly, and cell separations, microfluidics, and nanotechnology.
- Robotics and automation: The design and development of both individual instrumentation modules and integrated robotic systems for the automation of chemical or biological reactions or processes. Systems for the large-scale acquisition of multivariate information from biological systems also are of interest.
- Synthesis: Instruments for the synthesis of biomolecules at various scales.
- Micro/nanofabrication: Microfabricated and/or nanostructured devices and systems for use in biological research.
- Single molecule/cell approaches: Techniques, approaches, and devices for the analysis of biological systems at the single molecule, assembly, or single cell level.

ISD has the following shared interests within the BST IRG:

Many of the study sections of the BST IRG involve instrumentation at some level. The ISD study section could be the appropriate home when the central scientific or bioengineering question is design and development of instrumentation and methods of analysis. The following shared interests merit highlighting:

- **With Gene and Drug Delivery Systems [GDD]:** Applications on nano or microfabricated delivery vehicles and ballistic methods could be assigned to GDD. Applications on design and development of instrumentation to deliver samples and to monitor delivery could be reviewed by ISD.
- **With Biomaterials and Biointerfaces [BMBI]:** ISD has shared interests with the BMBI study section in the areas of development of microarray and nanoscale technologies and in sensing devices and associated surface chemistries. Applications with a principal focus on materials and surface chemistry may be directed to BMBI, whereas applications with a major emphasis on developing instrumentation for materials fabrication or use may be directed to ISD.
- **With Biodata Management and Analysis [BDMA]:** ISD has shared interests with the BDMA study section in the areas of data acquisition, analysis software, and hardware. If the focus is on data storage management, and manipulation, then BDMA may be appropriate. If the focus is on developing hardware or instrument development for data collection, then ISD may be appropriate.
- **With Microscopic Imaging [MI]:** Applications focusing on development of instrumentation for signal detection and signal transmission, or incorporation of imaging instrumentation into a larger system could be assigned to ISD. If the focus is on development of imaging instrumentation or imaging data analysis per se, then MI could be the appropriate home for review.

ISD has the following shared interests outside the BST IRG:

Multiple study sections in other IRGs will involve adaptation of instrumentation and analytical methods to specific biological, medical, or organ situations. If the focus is on the specific organ, system, or disease, then other IRGs may be appropriate. However, if the focus is on the design or development of the basic instrument or analytical method, ISD may be appropriate. Specific shared interests are:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG:** ISD shares interests with BCMB in the development and application of novel approaches to study molecular structure and interactions. In cases where the dominant emphasis of the application is on bioengineering or biomaterials, the application may be assigned to ISD. If the dominant emphasis of the application is on the chemistry or biophysics, the application may be assigned to BCMB.
- **With the Cell Biology [CB] IRG:** Cell separation and fermentation are areas of shared interest between CB and ISD. Applications that use cell separation and/or fermentation technologies to address research questions related to cell biology could be assigned to the CB IRG; applications addressing the technology of cell separation and/or fermentation could be assigned to ISD.
- **With the Infectious Diseases and Microbiology [IDM] and AIDS and Related Research [AARR] IRGs:** Grant applications focused on biosensors for detecting infectious agents could be assigned to IDM or AARR. Applications focused on developing detection technologies could be assigned to ISD.
- **With the Surgical Sciences, Biomedical Imaging, and Bioengineering [SBIB] IRG:** If the objective of the study is to address development of instruments for diagnosis, pathology, or treatment, the application may be directed to SBIB. If the objective of the study is to address development of instruments for understanding basic engineering and design principles, biological mechanisms or basic biology, the application may be directed to ISD.

Gene and Drug Delivery Systems Study Section [GDD]

[\[GDD Roster\]](#)

The Gene and Drug Delivery Systems [GDD] study section considers grant applications (R01, R21, SBIR/STTR, etc.) focused on the development and delivery of drugs, genes, and gene products that alter gene function or expression in the living organism. Research grant applications driven by bioengineering principle, design, or validation, but not necessarily driven by hypothesis, are expected. Related small business applications (SBIR and STTR) are reviewed in special emphasis panels.

Specific areas covered by GDD include:

- **Agents delivered:** Include DNA, RNA, RNA interference (RNAi), antisense oligonucleotides, large and small insert vectors, aptamers, peptide nucleic acids (PNAs), small molecule activators and inhibitors, antibiotics, vaccines, peptides, proteins, cells, and other drugs.
- **Vehicles:** Include viral and other vectors, liposomes, polyethylene glycol (PEG), and lipid-based transfection agents.
- **Delivery strategies:** Include electroporation, ultrasound, receptor mediated translocation, opto-injection, ballistic methods, vesicles, and viral agents.
- **Gene regulation of active agents:** Includes enhancers and silencers, tissue specificity, external control, nuclear vs. cytoplasmic localization, and targeted integration.
- **Expression patterns:** Include tissue and cellular localization, markers for expression, copy number, transcriptional and translational products, and activity-dependent probes.

GDD has the following shared interests within the BST IRG:

- **With Instrumentation and Systems Development [ISD]:** GDD shares interests with the ISD study section in the area of instruments for gene and drug delivery. Applications on nano or microfabricated delivery vehicles and ballistic methods could be assigned to GDD. Design and development of instrumentation to deliver samples and to monitor delivery could be reviewed by ISD.
- **With Biomaterials and Biointerfaces [BMBI]:** GDD could be assigned studies on using biomaterials to deliver genes and drugs into cells. BMBI could be assigned related studies emphasizing synthesis, physical characterization, biocompatibility, and toxicity of new synthetic materials intended for use as gene or drug delivery vehicles.
- **With Modeling and Analysis of Biological Systems [MABS]:** GDD shares interests with the MABS study section in the areas of gene regulatory networks, metabolic pathways and studies to perturb individual genes or regulatory factors. Applications on systems biology could be assigned to MABS. Applications on the delivery and expression of introduced genes, or on the restoration and enhancement of metabolic pathways could be assigned to GDD.
- **With Microscopic Imaging [MI]:** The GDD study section shares interests with the MI study section in the areas of cellular imaging as a readout, e.g., activity dependent probes, expression patterns, interaction probes, and single molecule reporters. Normally, applications focusing on imaging technology and development will be assigned to MI. Applications focusing on the delivery vehicle could be assigned to GDD.

GDD has the following shared interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB], Cell Biology [CB], and Biology of Development and Aging [BDA] IRGs:** Grant applications focused on basic biological mechanisms may be relevant to one or more of the IRGs indicated above. Applications focused on the design, development, and introduction of technology in support of gene, drug, and cell delivery are relevant to GDD.
- **With the Genes, Genomes, and Genetics [GGG] IRG:** Applications addressing research questions in genetics could be reviewed by the GGG IRG, whereas applications that are more broadly technology oriented or where an applied endpoint is not specified could be reviewed by GDD.
- **With the Health of the Population [HOP], Risk, Prevention and Health Behavior [RPHB], and Biobehavioral and Behavioral Processes [BBBBP] IRGs:** Grant applications focused on basic health behavior and behavioral genetics are relevant to the indicated IRGs. Grant applications focused on the design, development, and introduction of technology in support of gene and drug delivery are relevant to GDD.

- **With the Immunology [IMM] IRG:** Grant applications focused on basic immunological mechanisms could be assigned to the IMM IRG. Grant applications focused on the design and development of technology in support of gene and drug delivery, and development of delivery strategies based on antibodies, could be assigned to GDD.
- **With the Infectious Diseases and Microbiology [IDM] and AIDS and Related Research [AARR] IRGs:** Grant applications focused on infectious diseases and virology mechanisms, including diagnostics, vaccines, and delivery mechanisms, could be assigned to either IDM or AARR. Applications focused on developing technologies to introduce genes and drugs in a basic virology context or developing viral vectors for delivery could be assigned to GDD.
- **With the Oncological Sciences [ONC]; Hematology [HEME]; Cardiovascular Sciences [CVS]; Endocrinology, Metabolism, Nutrition, and Reproductive Sciences [EMNR]; Musculoskeletal, Oral, and Skin Sciences [MOSS]; Digestive Sciences [DIG]; Respiratory Sciences [RES]; and Renal and Urological Sciences [RUS] IRGs:** Grant applications focused on organ/disease specific biological mechanisms and therapies could be assigned to the relevant organ/disease indicated IRG. Applications focused on basic or developing technologies to introduce genes and drugs in a general cellular context could be assigned to GDD.
- **With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG:** SBIB shares interests with GDD in the delivery of drugs, genes, and gene products. Development of delivery techniques could be reviewed in SBIB if the objective of the study is to address questions of either diagnosis or pathology. If the study objective is to address questions of basic delivery techniques, or techniques for which specific applied endpoints are not defined, review could be in GDD.
- **With the Molecular, Cellular, and Developmental Neuroscience [MDCN]; Integrative, Functional, and Cognitive Neuroscience [IFCN]; and Brain Disorders and Clinical Neuroscience [BDCN] IRGs:** Grant applications focused on neuroscientific mechanisms could be assigned to one of the indicated IRGs. Applications focused on the design, development, and introduction of technology for gene and drug delivery in nervous systems could be assigned to GDD.

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Biomaterials and Biointerfaces Study Section [BMBI]

[\[BMBI Roster\]](#)

The Biomaterials and Biointerfaces Study Section [BMBI] reviews grant applications (R01, R21, SBIR/STTR, etc.) in materials science and the closely allied field of materials surfaces and their interactions with basic biological systems. The material aspects of biomaterials and surface science concern the design principles and theory and the synthesis, characterization, and optimization of new or existing materials including polymers, composites, metals, ceramics, nanomaterials, hybrid systems of natural and synthetic polymers, and biomimetics. The biological aspects of biomaterials science concern interactions of materials with proteins, membranes, cells, and tissues including studies related to scaffolds for tissue repair/tissue engineering, materials for bioreactors, biocompatibility issues, and microcirculation around implanted biomaterials. Grant applications concerned with biomaterials, biointerfaces, and biofunctional design need not be hypothesis driven, but may use known fundamental principles or theory to discover new basic approaches useful for understanding biological phenomena. Small business applications (SBIR and STTR) in the areas of materials science and technology for environmental monitoring are reviewed in special emphasis panels.

Specific areas covered by BMBI include:

- Research and development of efficient methods to assess biocompatibility of materials including: Predictive, low-cost in vitro and in vivo models with a focus on reliability, accelerated testing, failure analysis, imaging, and improved understanding of the biology-biomaterials interface.
- Molecular/cellular interfacial interactions including: Protein adsorption, cell adhesion, differentiation and growth, biomolecule function at interfaces, nonfouling surfaces, and bioactive surfaces.
- New materials development including: Design principles, synthesis of polymers, metals, ceramics, composites, glasses, carbons, biomimetic/bioinspired strategies for synthesis, structure-property relationships of biomaterials, bulk characterization of biomaterials, biodegradable and bioresorbable materials, material processing, and combinatorial approaches to the synthesis of new biomaterials.
- Nanoscience and nanotechnology including: Nanoparticles, nanostructured surfaces, nanocomposites, nanodevices, and multifunctional nanoparticles.
- Biomaterials properties including: Biocompatibility, blood/material interactions, toxicity, structure/property relationships, and biodurability.
- Drug delivery systems including: Carrier materials, fabrication of micro-scale devices, and biocompatibility.

- Gene delivery systems including: Carrier materials, preparation of biomaterials, biocompatibility, and fabrication of delivery devices.
- Chip- and microarray-based microtechnology including: Patterning, immobilization chemistry, nonfouling chemistry, detection modalities, MEMS (micro-electro-mechanical systems), lithography, and microfluidics.
- Tissue engineering including: New biomaterials and fabrication techniques for tissue engineering, cell-biomaterial interactions, transport and perfusion aspects of tissue engineering, bioreactors, cell and specific cell biology engineering.
- Self-assembled materials including: Block copolymers, surface assembly, protein assembly, biosignal delivery using self-assembled materials, biorecognition, liposomes, and tethered biomembrane mimics.
- Biosurface characterization and technology including: Surface analysis, surface modification, lubricity and tribology, and patterning.
- Biosensors including: Biorecognition, biocompatibility, nonfouling surfaces, and fouling mechanisms.

BMBI has the following shared interests within the BST IRG:

- **With Instrumentation and Systems Development [ISD]:** The BMBI and ISD study sections share interests in the areas of development of microarray and nanoscale technologies and in sensing devices and associated surface chemistries. Applications that focus on the materials and surface chemistry for a wide range of purposes may be directed to BMBI, whereas applications with major emphasis on materials fabrication for use in instrumentation development may be directed to ISD.
- **With Gene and Drug Delivery Systems [GDD]:** The GDD and BMBI study sections have shared interests in development and application of synthetic and biological materials for gene and drug delivery, including the incorporation of genetic material into bulk biomaterials, e.g., for enhancement of tissue engineering strategies. GDD could be assigned studies that focus on the use of biomaterials to deliver genes and drugs into cells. BMBI could be assigned related studies that focus on synthesis, physical characterization, biocompatibility, and toxicity of new synthetic materials intended for use as gene or drug delivery vehicles.
- **With Microscopic Imaging [MI]:** The BMBI and MI study sections share an interest in development of new materials for use as image enhancers and contrast agents. BMBI may review applications emphasizing development of new polymeric or nanoparticle based contrast agents or where materials synthesis, characterization, biocompatibility, and toxicity are prominent, whereas the MI study section may review applications emphasizing small molecule and soluble contrast agents for use in microscopic and micro-imaging applications.

BMBI has the following shared interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB]:** Applications that focus on biochemical or biophysical principles related to surfaces and to biomaterials could be assigned to BCMB. Applications that focus on bioengineering principles or technology development related to surfaces and to biomaterials could be assigned to BMBI.
- **Genes, Genomes, and Genetics [GGG]; Cell Biology [CB]; Biology of Development and Aging [BDA]; Immunology [IMM]; Infectious Diseases and Microbiology [IDM]; AIDS and Related Research [AARR]; Oncological Sciences [ONC]; Hematology [HEME]; Endocrinology, Metabolism, Nutrition, and Reproductive Sciences [EMNR]; Digestive Sciences [DIG]; Respiratory Sciences [RES]; Renal and Urological Sciences [RUS]; Molecular, Cellular, and Developmental Neuroscience [MDCN]; Integrative, Functional, and Cognitive Neuroscience [IFCN]; Brain Disorders and Clinical Neuroscience [BDCN] IRGs:** Because biomaterials and biointerfaces are relevant to a wide variety of biological and medical devices that are utilized in biological, medical, and clinical applications, BMBI has extensive interests in common with other IRGs. Where the issues involve research on and development of new materials or biocompatibility, assignment may be to BMBI. Where tissue integration and application to specific biological and medical devices and systems are primary foci, assignment may be to one of the other IRGs above.
- **With the Cardiovascular Sciences [CVS] IRG:** Due to the fundamental role of surfaces in triggering thrombosis and other blood and tissue reactions, the development of cardiovascular devices, including stents, heart valves, vascular grafts, artificial hearts, ventricular assist devices and others, is a significant area of overlap between CVS and BMBI. Applications on developing such devices for specific clinical or biomedical applications could be assigned to CVS (or SBIB, see below). Basic research and development applications on materials and surfaces that might be used for such devices could be assigned to BMBI.
- **With the Musculoskeletal, Oral and Skin Sciences [MOSS] IRG:** Grant applications on dental and orthopedic implants or tissue integration could be assigned to MOSS, whereas grant applications on basic research and development of materials and surfaces that might be used for such implants could be assigned to BMBI.
- **With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG:** Basic research and development of biomaterials and biocompatibility may be reviewed in BMBI, whereas research on and development of biomedical materials for specific medical devices or specific clinical applications, may be reviewed in SBIB.

Biodata Management and Analysis Study Section [BDMA]

[\[BDMA Roster\]](#)

The Biodata Management and Analysis [BDMA] study section will review grant applications (R01, R21, SBIR/STTR, etc.) that aim to develop technologies for the management and analysis of basic biological data, i.e., bioinformatics, computational biology, and computer science. This includes the review of data management technology in support of large-scale data collection and integration efforts. Research grant applications driven by bioengineering principle, design, or validation, but not necessarily driven by hypothesis, are expected.

Specific areas covered by BDMA:

- Methods for data management including: Data representation, standards and ontology development, data capture, data integrity and validation, data archiving, data distribution, data query, hardware and software for computer systems, database robotics, and interoperation and federation of databases.
- Methods for data analysis including: Numerical, statistical and mathematical methods; theoretical approaches to design and interpretation of large-scale studies, such as high throughput analyses; computational methods for organizing, maintaining, and integrating datasets, such as in proteomics and genomics.
- Visualization techniques: Summary, integration, and representation of data in meaningful ways, for example, graphical, auditory, tactile, and visual; methods for data mining, World Wide Web and other server representations and computer representations and simulations.

BDMA has the following shared interests within the BST IRG:

Most of the study sections in this IRG will involve some level of the management of data generated by their projects. The BDMA study section would be the appropriate home when basic methodology for data management is the central scientific or technical question. The following shared interests merit highlighting:

- With Microscopic Imaging [MI]: If the focus is on generation of images, then MI would be the appropriate home for review; however, if the focus is on image archiving, then BDMA would be the appropriate home.
- With Modeling and Analysis of Biological Systems [MABS]: BDMA shares interests with the MABS study section in the areas of bioinformatics and large scale data collection efforts or “omics” applications (genomics, proteomics, metabolomics, etc.). If the focus is on large-scale data analysis, then BDMA would be appropriate. If the focus is on modeling, review by MABS would be appropriate.
- With Instrumentation and Systems Development [ISD]: BDMA has shared interests with the ISD study section in areas of data acquisition, analysis software, and hardware. If the focus is on data storage and manipulation, then BDMA would be appropriate. If the focus is on hardware or instrument development for data collection, then ISD would be appropriate.

BDMA has the following shared interests outside the BST IRG:

- With the Biological Chemistry and Macromolecular Biophysics (BCMB); Cell Biology (CB); Biology of Development and Aging (BDA) IRGs: If the focus is on the use of computational or database tools for analysis of chemical or biophysical interactions among molecules, cell physiological processes, development, differentiation, or signal transduction, then review by one of the IRGs identified above could be appropriate. If the primary focus is on development of computational or database tools, review by BDMA could be appropriate.
- With the Genes, Genomes, and Genetics [GGG] IRG: If the focus is on experimental or computational investigation of questions related to genetics, regulation of gene expression, or genomics, review by GGG could be appropriate. If the primary focus is on developing database technology, related computational analyses, or statistical methods for analyzing data, including genetic/genomic data, review by BDMA could be appropriate.
- With the Health of the Population [HOP] IRG: HOP reviews applications related to population processes, composition and distribution, and the development and validation of methodologies for population research, including measurement, design, and statistical analysis. Other statistical methodology applications could be reviewed by BDMA.
- With the Infectious Diseases & Microbiology [IDM] and AIDS & Related Research [AARR] IRGs: If the focus is on experimental or computational investigation of questions related to microbes, assignment to IDM or AARR could be appropriate; if the focus is on developing database technology, related computational analyses, or statistical methods for analyzing data, including infectious disease and virology data, assignment to BDMA could be appropriate.

- **With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG:** BDMA shares interests with SBIB in the area of management of biological and medical data. If the objective of the study is to address questions of diagnosis, pathology, treatment, or medical data management, assignment could be to SBIB. If the objective of the study is to address questions of basic data management or biology, assignment could be to BDMA.

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Modeling and Analysis of Biological Systems [MABS]

[\[MABS Roster\]](#)

The Modeling and Analysis of Biological Systems [MABS] study section will review applications (R01, R21, R15, etc.) that develop modeling/enabling technologies for understanding the complexity of biological systems. Research grant applications driven by bioengineering and mathematical principle, design, or validation, but not necessarily driven by hypothesis, are expected. The scope of interactions reviewed here ranges from molecular to supramolecular and cellular in prokaryotic and eukaryotic cells, and to organelle and to tissue in eukaryotic systems. For these applications, the integration of interactions through levels and scales and the emergence of patterns that help to explain system behavior are the ultimate goals for applying these tools.

Specific areas covered by MABS include:

- Modeling methods: Data integration into models; computational systems and tools for model construction, analysis, and simulation; sensitivity analysis; optimization techniques; dimensional analysis; structural analysis (topology); emergent properties of complex systems; model visualization; *in silico* modeling; multiscale/multilevel modeling; and modeling of evolving and adaptive systems.
- Specific models of important processes: molecular interactions, signal transduction; biochemical networks; gene regulatory networks; metabolic networks; intracellular dynamics; cell structural dynamics; cell communication and tissue physiology.
- Integration of modeling and experiment: experimental validation of models; tools for analysis of assemblies, complexes, and networks; cell and molecular interactions, molecular and cellular data unification; network reconstruction; high-throughput data integration; combinatorial and statistical approaches to genomics, proteomics and glycomics data; analysis of large datasets; computer simulations.
- Development and adaptation of mathematical methods and models: deterministic and stochastic, Boolean, discrete and continuous; dynamical systems analysis; timescale and spatial decomposition; numerical approaches including stiff and sparse systems; sparse systems, finite difference and element methods; statistical tools include time series analysis and Bayesian methods.

MABS has the following shared interests within the BST IRG:

- **With Gene and Drug Delivery [GDD]:** MABS shares interests with the GDD study section in the areas of gene regulatory networks, metabolic pathways and studies to perturb individual genes or regulatory factors. Applications on systems biology could be assigned to MABS. Applications on the development and expression of introduced genes, and the restoration or enhancement of metabolic pathways could be assigned to GDD.
- **With Biodata Management and Analysis [BDMA]:** MABS shares interests with the BDMA study section in the areas of bioinformatics and large-scale data collection efforts or “omics” applications (genomics, proteomics, metabolomics, etc.). If the focus is on modeling or computer simulations, review by MABS could be appropriate. If the focus is on large-scale data collection or analysis, then BDMA could be appropriate.

MABS has the following shared interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB]; Cell Biology [CB]; and Biology of Development and Aging [BDA] IRGs:** MABS shares computational modeling interests with BCMB, CB, and BDA. If the focus is experimental investigation of chemical or biophysical interactions among molecules, cell physiological processes, development, differentiation, or signal transduction, then review by the IRGs identified above could be appropriate. If the primary focus is development of technology for computational modeling or development of methods for combining modeling or related analyses, review by MABS could be appropriate.
- **With the Genes, Genomes, and Genetics [GGG] IRG:** If the focus is on regulation of gene expression or genomics, review by GGG could be appropriate. If the primary focus is on modeling technology or related analyses, review by MABS could be appropriate.
- **With the Infectious Diseases and Microbiology [IDM] and AIDS and Related Research [AARR] IRGs:** If the scientific focus is on application of existing modeling paradigms to microbes, assignment to IDM or AARR could be appropriate; if the scientific focus is on development of new modeling paradigms for microbes or related computational analyses, assignment to MABS could be appropriate.

- **With the Oncological Sciences [ONC] IRG:** Review by ONC could be appropriate if cancer cell physiology, signal transduction, or therapy is the focus. Review by MABS could be appropriate if the focus is modeling or related analyses.
- **With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG:** MABS shares interests with SBIB in the areas of biological and medical computing and informatics as related to modeling physiological function. If the objective of the study is to address questions of diagnosis, pathology, or therapy, assignment could be to SBIB. If the objective of the study is to address questions of basic biology, modeling, or simulation, assignment could be to MABS.

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Microscopic Imaging Study Section [MI]

[\[MI Roster\]](#)

The Microscopic Imaging [MI] study section reviews applications (R01, R21, SBIR/STTR, etc.) that aim to develop, improve and implement quantitative techniques for the static and dynamic visualization of molecules, macromolecular machines and complexes, organelles, cells, and model systems in physiologically active states. Large animal and human studies will not be considered in MI. Examples of methodologies relevant to MI include crystallography, TEM (transmission electron microscopy), electron cryomicroscopy, SEM (scanning electron microscopy), ESEM (environmental scanning electron microscopy), AFM (atomic force microscopy), SFM (scanning force microscopy), fluorescence microscopy and laser spectroscopy including microarray/chip analysis, confocal and scanning light microscopy, vibrational spectroscopic microscopy, multi-photon microscopy, x-ray microscopy, acoustic microscopy, NMR (nuclear magnetic resonance) and microscopic applications of MRI (magnetic resonance imaging). Imaging principles or instruments may be developed, and proposals need not be hypothesis-driven.

Specific areas covered by MI include:

- Development and Improvement of Instrumentation for Microscopy: major microscopic devices and accessories such as specimen holders and environmental chambers for molecules, assemblies or living cells; high resolution and large pixel detectors, high-resolution film scanners, specimen preparative apparatus, computer automation of data collection and remote access.
- Improvement of Specimen Preparation Methodology: Crystallization of membrane proteins and large assemblies, chemical and cryo specimen preservations, non-invasive preparative methods, chemical agents for contrast enhancement, molecular tagging, cell labeling, genetically expressed labels and studies of chemical and radiation damage effects.
- Image Acquisition and Analysis: Validation of image formation theory, light propagation and scattering analysis, data management, phasing methods, algorithm development including filtering, signal detection, data reduction, image enhancement, pattern recognition, restoration, reconstruction, segmentation, feature extraction, tomographic and single particle reconstruction, visualization of multi-dimensional information, and high throughput, automatic data processing at the cellular or subcellular level.
- Data Mining: Integration of information derived from complementary imaging techniques and bioinformatics to derive functional mechanisms.

MI has the following shared interests within the BST IRG:

- **With Instrumentation and Systems Development [ISD]:** Applications focusing on development of instrumentation for signal detection and signal transmission, or incorporation of imaging instrumentation into a larger system could be assigned to ISD. If the focus is on development of imaging instrumentation or imaging data analysis per se, then MI could be the appropriate home for review.
- **With Gene and Drug Delivery Systems [GDD]:** MI shares interests with the GDD study section in the areas of cellular imaging as a readout, e.g., activity dependent probes, expression patterns, interaction probes, and single molecule reporters. Applications that focus on the delivery vehicle could be assigned to GDD. Applications focusing on imaging technology and development could be assigned to MI.
- **With Biomaterials and Biointerfaces [BMBI]:** MI shares interests with the BMBI study section in development of new materials for use as image enhancers and contrast agents. MI may review applications emphasizing small molecule and soluble contrast agents, whereas BMBI may review applications emphasizing development of new polymeric or nanoparticle based contrast agents or where materials synthesis, characterization, biocompatibility, and toxicity are prominent.
- **With Biodata Management and Analysis [BDMA]:** If the focus is on image archiving, then BDMA may be the appropriate home. However, if the focus is on generation of images, then MI may be the appropriate home for review.

MI has the following shared interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG:** The BCMB IRG generally reviews applications on specific

biological/chemical systems whereas MI is focused on general methodology and technology. Applications focusing on biochemical/biophysical principles or synthesis of imaging agents could be assigned to BCMB; applications focusing on bioengineering principles or application of agents to new imaging approaches could be assigned to MI.

- **With the Cell Biology [CB] IRG**: Imaging studies are an area of shared interest. Applications addressing research questions focused on cell biology mechanisms or processes could be assigned to the CB IRG; applications addressing the technology of cell imaging could be assigned to MI.
- **With the Genes, Genomes, and Genetics [GGG] IRG**: An area of shared interest may be molecular image analysis, e.g., of fluorescence in situ hybridization (FISH) datasets or microarray/chip datasets. Applications addressing research questions that are linked to genetic problems could be reviewed by the GGG IRG, whereas molecular imaging studies that are more technology oriented or where specific uses are not identified could be reviewed by MI.
- **With the Infectious Diseases and Microbiology [IDM] and AIDS and Related Research [AARR] IRGs**: Applications focused on research questions related to infectious disease and virology could be assigned to IDM or AARR; applications focused on technology necessary for molecular or cellular imaging of microbes could be assigned to MI.
- **With the Oncological Sciences [ONC] IRG**: Applications that focus on radiation damage due to therapeutic radiation could be assigned to ONC. Applications that focus on radiation damage due to specimen analysis could be referred to MI.
- **With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG**: Shared interests exist with study sections in SBIB in development of instrumentation, techniques, and procedures for imaging molecules and organelles. Generally, applications that address imaging technology at the level of the tissue or whole organism could be reviewed in SBIB; applications that address imaging technology at the level of the cell and below could be reviewed in MI. Also, if the objective of the study is to address questions of diagnosis, pathology, or treatment, assignment could be to SBIB, e.g., contrast agents for medical imaging. If the study objective is to address questions of either mechanism or basic biology, assignment could be to MI, e.g., contrast agents for microscopic imaging. MI typically does not review applications involved with large animals and human subjects.

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Bioengineering Sciences and Technologies Small Business Activities [SBIR/STTR] Special Emphasis Panels

The Bioengineering Sciences and Technology IRG reviews small business applications within all of the research areas covered in our regular study sections, plus the additional areas highlighted below. Some SBIR/STTR applications are reviewed in the context of regular study sections [Instrumentation and Systems Development [ISD], Biodata Management and Analysis [BDMA], Modeling and Analysis of Biological Systems [MABS], Microscopic Imaging [MI]], whereas other SBIR/STTR applications are reviewed in one of the following four special emphasis panels:

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Delivery Systems and Nanotechnology SBIR/STTR SEP [DSN SEP - BST (10)]

[\[BST \(10\) Roster\]](#)

The Delivery Systems and Nanotechnology SBIR/STTR SEP reviews small business applications in the general areas of new strategies, devices, vectors, and agents for delivering genes or drugs into cells or organisms.

Specific areas covered by the DSN SEP include:

- Viral and nonviral vectors for gene delivery
- Genetic expression systems
- Loaded nanomaterials, time release formulations, and other delivery vehicles
- Devices and instrumentation for gene and drug delivery
- Manufacturing processes for production of delivery vectors or vehicles
- Initial testing of devices, vectors or vehicles in cellular and animal models

The DSN SEP shares the following interests within the BST IRG:

- **With the Materials Science and Environmental Monitoring SEP [MSEM SEP - BST (11)]:** The Delivery Systems and Nanotechnology SBIR SEP shares interests with the MSEM SBIR SEP in the development of nanoparticles and other nano-scale materials. If the emphasis is on the development of nano-scale materials and their initial testing *in vivo*, including cellular and/or animal systems, then assignment to the DSN SEP may be appropriate. If the emphasis is on the development of nanomaterials and their initial testing *in vitro*, including cell lines, then assignment to the MSEM SEP may be appropriate.
- **With the Devices and Detection Systems SEP [DDS SEP - BST (12)]:** The Delivery Systems and Nanotechnology SEP shares interests with the DDS SEP in the development of devices and instrumentation. If the emphasis is on the development of devices and instrumentation for delivering genes and drugs into cells and organisms, then assignment to the DSN SEP may be appropriate. If the emphasis is on the development of devices and instrumentation for application in other biomedical, pharmaceutical, or research settings, then assignment to the DDS SEP may be appropriate.
- **With the Assays and Methods Development SEP [AMD SEP - BST (13)]:** The Delivery Systems and Nanotechnology SEP shares interests with the AMD SEP in the development of devices, vectors, and vehicles for delivering genes and drugs into cells and organisms; monitoring the activities of the delivered agents; and manufacture of pharmaceutical-grade delivery vectors. If the emphasis is on development of instrumentation and agents on a small scale or testing them in cellular or animal models, then assignment to the DSN SEP may be appropriate. If the emphasis is on development or scale-up of instrumentation and agents on a large scale, then assignment to the AMD SEP may be appropriate.
- **With the Microscopic Imaging Study Section [MI]:** The Delivery Systems and Nanotechnology SEP shares interests with the MI study section in the development of imaging instrumentation and genetic reporter systems. If the emphasis is on the development of imaging instrumentation and genetic reporter systems for use in monitoring the efficiency or activity of genes or drugs delivered for an eventual therapeutic purpose, then assignment to the DSN SEP may be appropriate. If the emphasis is on the development of imaging instrumentation and genetic reporter systems for use in visualizing the activities of cells or molecules to address a biological or biomedical question, then assignment to the MI study section may be appropriate.

The DSN SEP shares the following interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG:** The Delivery Systems and Nanotechnology SEP shares interests with the BCMB IRG in the formulation and synthesis of new materials and vehicles. If the emphasis is on the development of new materials and vehicles for delivering agents into cells or organisms, or to elucidate engineering principles, then assignment to the DSN SEP may be appropriate. If the emphasis is on the development of new materials and vehicles to elucidate biochemical or biophysical principles, or on the application of existing technologies to biochemical or biophysical problems, then assignment to the BCMB IRG may be appropriate.
- **With the Genes, Genomes, and Genetics [GGG] IRG:** The Delivery Systems and Nanotechnology SEP shares interests with the GGG IRG in the area of gene therapy. If the emphasis is on the development and initial testing of delivery devices, vectors and vehicles, even if their eventual intended use is gene therapy, or to elucidate engineering principles, then assignment to the DSN SEP may be appropriate. If the emphasis is on the use of existing devices, vectors, or vehicles to ameliorate an inborn error, then assignment to the GGG IRG may be appropriate.

- **With the Oncological Sciences [ONC] IRG:** The Delivery Systems and Nanotechnology SEP shares interests with the ONC IRG in the development of devices, vectors, or vehicles for delivering genes and drugs. If the emphasis is on the development and initial testing of new technology for delivering genes and drugs into cells or biological systems, including tumors, or to elucidate engineering principles, then assignment to the DSN SEP may be appropriate. If the emphasis is on the application of existing technology for delivering genes and drugs into tumors and monitoring therapeutic results, or for elucidating biological mechanisms related to oncology or therapeutics, then assignment to the ONC IRG may be appropriate.
- **With the Surgical Sciences, Biomedical Imaging, and Bioengineering [SBIB] IRG:** The Delivery Systems and Nanotechnology SEP shares interests with the SBIB IRG in the area of anesthesiology and drug delivery. If the emphasis is on the development of new delivery systems and their initial testing in cellular or animal systems, then assignment to the DSN SEP may be appropriate. If the emphasis is on the application of existing technology or testing of new technologies in clinical/surgical settings, then assignment to the SBIB IRG may be appropriate.

Materials Science and Environmental Monitoring SBIR/STTR SEP [MSEM SEP - BST (11)]

[BST (11) Roster]

The Materials Science and Environmental Monitoring SBIR/STTR SEP reviews small business applications in the general areas of new surfaces, coatings, and materials, and technology for environmental and biodefense purposes.

Specific areas covered by the MSEM SEP include:

- Biosensors, chips, and other platforms for detecting chemicals, toxins, and pathogens in the environment or workplace
- Materials, coatings, and surfaces for use in gene and drug delivery, medical devices and implants, biosensors, detectors, and manufacturing settings
- Nano-scale materials, nanoparticles, and surface phenomena
- Tissue engineering, cell/scaffold interactions, cellular assays of toxicity and tolerance
- Platforms, devices, and manufacturing practices for reducing chemicals, toxins, and pathogens in the environment or workplace

The MSEM SEP shares the following interests within the BST IRG:

- **With the Delivery Systems and Nanotechnology SEP [DSN SEP - BST (10)]:** The Materials Science and Environmental Monitoring SEP shares interests with the DSN SEP in the development of devices and instrumentation. If the emphasis is on the development of devices and instrumentation for use in the environment, workplace, or industrial setting, then assignment to the MSEM SEP may be appropriate. If the emphasis is on the development of devices and instrumentation for delivering genes and drugs into cells and organisms, then

assignment to the DSN SEP may be appropriate.

- **With the Devices and Detection Systems SEP [DDS SEP - BST (12)]**: The Materials Science and Environmental Monitoring SEP shares interests with the DDS SEP in the development of instrumentation and detection technology. If the emphasis is on development of devices or instrumentation for use in the environment, workplace, or industrial setting, then assignment to the MSEM SEP may be appropriate. If the emphasis is on development of devices or instrumentation for use in the biomedical, pharmaceutical, or research setting, then assignment to the DDS SEP may be appropriate.
- **With the Assays and Methods Development SEP [AMD SEP - BST (13)]**: The Materials Science and Environmental Monitoring SEP shares interests with the AMD SEP in the development of assays and materials. If the emphasis is on the development of assays and materials for screening the environment, workplace, or industrial setting, then assignment to the MSEM SEP may be appropriate. If the emphasis is on development of assays and materials for screening in the biomedical, pharmaceutical or research setting, then assignment to the AMD SEP may be appropriate.

The MSEM SEP shares the following interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG**: The Materials Science and Environmental Monitoring SEP shares interests with the BCMB IRG in the areas of materials science and biosensors. If the emphasis is on the development of new materials or biosensors for use in biomedical, pharmaceutical, or research settings, or to elucidate engineering principles, then assignment to the MSEM SEP may be appropriate. If the emphasis is on elucidation of biophysical or biochemical principles that may be used to understand materials or to develop biosensors, or on the application of existing technology to biophysical research problems, then assignment to the BCMB IRG may be appropriate.
- **With the Surgical Sciences, Biomedical Imaging, and Bioengineering [SBIB] IRG**: The Materials Science and Environmental Monitoring SEP shares interests with the SBIB IRG in the area of medical devices, medical sensors, and implants. If the emphasis is on the development of new coatings, surfaces, or materials for eventual use in medical devices, sensors, or implants, or to elucidate basic bioengineering principles, then assignment to the MSEM SEP may be appropriate. If the emphasis is on the application or testing of existing coatings, surfaces, or materials in medical devices, sensors, or implants, or to elucidate bioengineering principles related to clinical applications, then assignment to the SBIB IRG may be appropriate.

Devices and Detection Systems SBIR/STTR SEP

[DDS SEP: BST (12)]

[\[BST \(12\) Roster\]](#)

The Devices and Detection Systems SBIR/STTR SEP reviews small business applications in the general area of instrumentation and systems development, and related engineering principles.

Specific areas covered by the DDS SEP include:

- Chips, microarrays, and other platforms for molecular separations and screens, immunoassays, chemical reactions,

and molecular detection

- Non-invasive biosensors for detecting or measuring drugs or other analytes in bodily fluids
- Portable devices for point-of-care use, first response, or field monitoring
- Microfluidic, nanofluidic, and robotic systems
- Detectors and signal capture systems for use in instrumentation, molecular screens, and immunoassays
- Power supplies, battery design, and other electrochemical devices

The DDS SEP shares the following shared interests within the BST IRG:

- **With the Delivery Systems and Nanotechnology SEP [DSN SEP - BST (10)]**: The Devices and Detection Systems SEP shares interests with the DSN SEP in the development of devices and instrumentation. If the emphasis is on the development of devices and instrumentation for delivering genes and drugs into cells and organisms, then assignment to the DSN SEP may be appropriate. If the emphasis is on the development of devices and instrumentation for application in other biomedical, pharmaceutical, or research settings, then assignment to the DDS SEP may be appropriate.
- **With the Materials Science and Environmental Monitoring SEP [MSEM SEP - BST (11)]**: The Devices and Detection SEP shares interests with the DDS SBIR SEP in the development of detection technology and instrumentation. If the emphasis is on development of devices or instrumentation for use in the environment, workplace, or industrial setting, then assignment to the MSEM SEP may be appropriate. If the emphasis is on development of devices or instrumentation for use in biomedical, pharmaceutical, or research settings, then assignment to the DDS SEP may be appropriate.
- **With the Assays and Methods Development SEP [AMD SEP - BST (13)]**: The Devices and Detection SEP shares interests with the AMD SEP in the development of chips, sensors, platforms, and detectors. If the emphasis is on development of these devices for use in small-scale settings, then assignment to the DDS SEP may be appropriate. If the emphasis is on development of these devices for use in large-scale or high throughput settings, then assignment to the AMD SEP may be appropriate.

The DDS SEP shares the following interests outside of the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG**: The Devices and Detection Systems SEP shares interests with the BCMB IRG in the area of instrumentation technology. If the emphasis is on the development of new instrumentation to detect or measure a specific molecule or analyte, or to elucidate engineering principles, then assignment to the DDS SEP may be appropriate. If the emphasis is on the development of instrumentation for elucidating biochemical or biophysical principles, or the application of existing instrumentation to biochemical or biophysical problems, then assignment to the BCMB IRG may be appropriate.
- **With the Surgical Sciences, Biomedical Imaging, and Bioengineering [SBIB] IRG**: The Devices and Detection Systems SEP shares interests with the SBIB IRG in the area of instrumentation development. If the emphasis is on the development of non-invasive, hand-held, or portable instrumentation, even if intended for eventual use in clinical or health care settings, or to elucidate basic bioengineering principles, then assignment to the DDS SEP may be appropriate. If the emphasis is on the development of instrumentation for use in surgery, medical implantation, or other clinical applications, then assignment to the SBIB IRG may be appropriate.

[\[BST \(13\) Roster\]](#)

The Assays and Methods Develop SBIR/STTR SEP reviews small business applications in the general areas of high throughput (HTP) molecular assays, large-scale reactions, and HTP screening.

Specific areas covered by the AMD SEP include:

- Reporter systems for monitoring molecular interactions, drug candidates, and molecular or cellular activity
- Chips, microarrays, biosensors, and other HTP platforms
- Instrumentation, fluidics, and robotics for HTP assays or large-scale screens
- Large-scale assays for genomic, proteomic, and metabolomic studies
- Large-scale synthesis of biological molecules or drugs
- Technology for the manufacture of biological molecules or drugs, including production and purification of recombinant proteins or designer molecules
- Synthetic biology

The AMD SEP has the following shared interests within the BST IRG:

- **With the Delivery Systems and Nanotechnology SBIR/STTR SEP [DSN BST (10)]**: The Assays and Methods Development SBIR/STTR SEP shares interests with the DSN SEP in the development of devices, vectors, and vehicles for delivering genes and drugs into cells and organisms; monitoring the activities of the delivered agents; and manufacture of pharmaceutical-grade delivery vectors. If the emphasis is on the large-scale development or scale-up of devices, vectors, and vehicles, then assignment to the AMD SEP may be appropriate. If the emphasis is on development of devices, vectors, or vehicles on a small scale or testing them in cellular or animal models, then assignment to the DSN SEP may be appropriate.
- **With the Materials Science and Environmental Monitoring SBIR/STTR SEP [MSEM BST (11)]**: The Assays and Methods Development SBIR/STTR SEP shares interests with the MSEM SEP in the development of surfaces, coatings, and materials, as well as assays, biosensors, platforms, and methods. If the emphasis is on the development of technology for use in the biomedical, pharmaceutical, or research setting or manufacture, then assignment to the AMD SEP may be appropriate. If the emphasis is on the development of technology for use in environmental science, occupational safety, or biodefense, then the MSEM SEP may be appropriate.
- **With the Devices and Detection Systems SEP [DDS BST (12)]**: The Assays and Methods Development SEP shares interests with the DDS SEP in the development of chips, sensors, platforms, and detectors. If the emphasis is on the development of these devices for use in large-scale or HTP science, then assignment to the AMD SEP may be appropriate. If the emphasis is on the development of these devices for use in small-scale settings, then assignment to the DDS SEP may be appropriate.
- **With the Microscopic Imaging study section [MI]**: The Assays and Methods Development SEP shares interests

with the MI study section in the development of imaging technology to monitor cellular or molecular activity. If the emphasis is on the development of imaging technology for use in large-scale or HTP settings, then assignment to the AMD SEP may be appropriate. If the emphasis is on the development of imaging technology for use in small-scale settings, then assignment to the MI study section may be appropriate.

The AMD SEP has the following shared interests outside the BST IRG:

- **With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG:** The Assays and Methods Development SEP shares interests with the BCMB IRG in tools and instrumentation, and in drug discovery and development. If the emphasis is on technology development or elucidating engineering principles, then assignment to the AMD SEP may be appropriate. If the emphasis is on elucidating biochemical or biophysical principles for use in developing new tools, instrumentation, or drug discovery, or on the application of existing technology to these problems, then assignment to the BCMB IRG may be appropriate.
- **With the Cell Biology [CB] IRG:** The Assays and Methods Development SEP shares interests with the CB IRG in assays and systems for monitoring cellular activity. If the emphasis is on technology development for use in high throughput settings, monitoring a variety of biological activities, or elucidating engineering principles, then assignment to the AMD SEP may be appropriate. If the emphasis is on the development of systems to address individual questions related to cell biology, or application of existing technology to individual research problems, then assignment to the CB IRG may be appropriate.
- **With the Genes, Genomes, and Genetics [GGG] IRG:** The Assays and Methods Development SEP shares interests with the GGG IRG in technology for genomic studies. If the emphasis is on technology development, HTP settings, or elucidating engineering principles, then assignment to the AMD SEP may be appropriate. If the emphasis is on the application of existing technology to individual research problems, or elucidating genetic principles or the genome, then assignment to the GGG IRG may be appropriate.

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Technology Development Fellowship Special Emphasis Panel [F14]

Technology Development

[Bioengineering Sciences and Technologies (BST) Integrated Review Group]

[[F14 Roster](#)]

The Technology Development panel reviews fellowship applications that focus on fundamental aspects of bioengineering and technology development in their early stages, before specific practical uses are proven. Fellowship applications need not be hypothesis-driven and may instead focus on the development of specific products, methods, or principles. Fellowship applications that propose basic engineering science, methodology, and technology development in the areas of gene and drug delivery, biomaterials and biointerfaces, data management and analysis, modeling and analysis of biological systems, instrumentation systems and development, and microscopic imaging are appropriate. Examples of specific areas covered are listed below:

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- Gene and drug delivery, including viral and nonviral vector development and testing, siRNA; delivery systems such as electroporation, ultrasound, transfection, and liposomes; targeted nanoparticles, and controlled release vehicles; monitoring expression or release of agents delivered
- Biomaterials and biointerfaces, including surface chemistry, materials science, biomimetics, nanoparticles, biocompatibility and tissue interactions, tissue engineering
- Data management and archiving, bioinformatics algorithms, design and integration of large datasets, grid computing, ontologies, data mining and data representation and visualization
- Mathematical modeling and computational biology, including algorithm development and statistics for simulating the function and behavior of molecules, networks and pathways, organs and tissues
- Instrumentation and systems for the analysis, detection, separation, synthesis, and screening of biological and medicinal molecules and cells, including high throughput technology, device fabrication, micro/nanofluidics, lithography, LIMS systems, robotics, microarrays and lab-on-a-chip; single-molecule and single-cell studies; HTP assays for proteomics, cell/tissue arrays, and drug screening; remote and computer control systems, wearable monitors, and implantable devices; technology for environmental monitoring such as detectors and sensors for biohazards, pollutants, food contaminants, and pathogens
- Microscopic imaging technology, including instrumentation (EM, AFM, fluorescent and confocal microscopes), genetic reporters, and probes (FRET pairs, contrast agents, and quantum dots) for visualizing intracellular components and single molecules; image analysis and management, including image enhancement, pattern recognition, reconstruction and tomography, and databases for cellular images

Shared Interests:

F04A (Chemical and Bioanalytical Science): Applications that are concerned primarily with elucidating the chemical principles of biologically and medicinally important molecules may be assigned to F04A; applications that are concerned primarily with the development of new methods, instrumentation, or technology for use in studies of biologically and medicinally important molecules may be assigned to F14.

F04B (Biophysical and Biochemical Science): Applications that are concerned primarily with elucidating the structural principles, biophysical behavior, and dynamics of biological macromolecules may be assigned to F04B; applications that are concerned with the development of new methods, instrumentation, or technology for use in studies of biological macromolecules may be assigned to F14.

F05 (Cell Biology and Development): Applications that are concerned primarily with elucidating the basic principles of cell structure, function, regulation, and differentiation may be assigned to F05; applications that are concerned primarily with the development of new methods, instrumentation, or technology for studies of cell structure, function, regulation, and differentiation may be assigned to F14.

F08 (Genomics, Genetics, DNA Replication, and Gene Expression): Applications that are concerned primarily with elucidating genetic principles, genome organization, or molecular mechanisms may be assigned to F08; applications that are concerned primarily with the development of new methods, instrumentation, or technology for studies of genetic principles, genome organization, or molecular mechanisms may be assigned to F14.

F13 (Infectious Diseases and Microbiology): Applications that are concerned primarily with virology and viral pathogenesis, bacteriology and bacterial pathogenesis, fungal pathogenesis, parasitology and parasitic diseases, innate and adaptive host responses to these microbes and viruses, and the development of anti-infective agents to treat and prevent infectious disease may be assigned to F13. Applications that are concerned primarily with development of technology for detecting pathogens, high throughput screening technology for identifying inhibitors of these pathogens, and technology for designing and testing vectors for eventual use in recombinant protein production or in gene or drug delivery may be assigned to F14.

SBIB F (Surgical Sciences, Biomedical Imaging, and Bioengineering): Applications that are concerned primarily with bioengineering and technology development in support of the clinical and surgical sciences may be assigned to SBIB; applications that are concerned primarily with bioengineering and technology development in support of the basic and biological sciences may be assigned to F14.

MEDI (Surgical Sciences, Biomedical Imaging, and Bioengineering): Applications that are concerned primarily

with medical imaging may be assigned to MEDI; applications that are concerned primarily with microscopic imaging may be assigned to F14.

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